



Department of Energy
Washington, DC 20585

July 1, 2009

Dear ENERGY STAR® Stakeholders:

DOE hereby provides the second draft ENERGY STAR performance criteria for several lighting applications to be added to Category A: outdoor area pole-mounted and roadway luminaires, outdoor wall-mounted area luminaires ("wall packs"), and parking garage/canopy luminaires. First draft criteria for these applications were published in August 2008 as part of a larger set of additions to Category A. These outdoor area lighting applications were removed from the ENERGY STAR Program Requirements for SSL Luminaires version 1.1 (published Dec 19, 2008 and effective Feb 1, 2009) because additional analysis was needed to address issues raised during the first stakeholder comment and review period. In the meantime, DOE has developed a new approach for evaluating the performance of outdoor area and roadway lighting, described in this letter.

Outdoor area and roadway lighting, outdoor wall packs, and parking garage/canopy lighting are being proposed for inclusion in the ENERGY STAR for SSL Luminaires program at this time for several reasons:

- 1) LED-based luminaires intended for these applications are available through normal market channels, and new products are being introduced regularly.
- 2) Energy-efficiency programs, municipalities, and other stakeholders have indicated a high level of interest in these applications.
- 3) CALiPER testing of market-available luminaires in these categories reveals a wide range of performance in terms of luminaire efficacy, total luminous flux, color characteristics, and other attributes.
- 4) Demonstration projects sponsored by utilities, municipalities, and the DOE GATEWAY program indicate potential for energy savings, but also the need for minimum performance guidelines for these applications.

DOE invites stakeholder review and comments regarding these second draft criteria by July 31, 2009. Depending on the nature of comments received, DOE intends to revise the criteria as necessary, and to add them to the existing ENERGY STAR Program Requirements for SSL Luminaires as version 1.2. This revision provides performance criteria for SSL luminaires for use in several additional lighting applications. These revisions do not change the performance requirements for the Category A applications included in version 1.1. **Please note the attached document addresses only the three lighting applications proposed for addition to version 1.1. Requirements pertaining to all luminaires, to LED packages, modules, and arrays used in luminaires, and other general requirements remain unchanged; please reference the version 1.1 document for these requirements.**

This letter explains DOE's overall approach in setting efficacy and performance requirements for Category A additions; and summarizes key differences between the second draft criteria and the Aug 2008 first draft.

OVERALL APPROACH

DOE's approach in setting minimum efficacy requirements in the ENERGY STAR for SSL Luminaires program encompasses two primary concerns: 1) ENERGY STAR qualified SSL luminaires must be energy efficient compared to incumbent technology; and 2) ENERGY STAR requirements must keep pace with the ongoing, rapid changes in SSL technology and product development. As LED technology continues to improve in light output, efficacy, durability, color quality, product offerings, and cost, LED luminaires are becoming available for a broader range of lighting applications, in some cases competing with the highest-efficacy incumbent lighting technologies.

Minimum luminaire efficacy levels established in the first ENERGY STAR for SSL criteria (version 1.0) were designed such that qualified SSL luminaires would be at least as energy efficient as other ENERGY STAR qualified lighting products for the same application. Due to recent improvements in LED technology, efficacy requirements for applications added in version 1.1 and thereafter have been set to yield at least 20% energy savings over the dominant incumbent light source technology, by lighting application.

FITTED-TARGET EFFICACY (FTE) METRIC

DOE has developed a new efficacy metric for outdoor area and roadway luminaires. Fitted-Target Efficacy (FTE) meaningfully gauges a luminaire's performance independent of a specific application. Two key assumptions underlie the FTE metric. First, relatively rectangular distribution patterns cover most areas more efficiently (with less unnecessary overlap) than rounded distributions. Second, a luminaire's approximate area of coverage can be defined as the area illuminated to IES-recommended uniformity ratios.

The FTE metric is similar to luminaire efficacy in that its units are luminaire output (lumens) per unit of power (watt). However, FTE differentiates useful lumens from those that may cause glare, wasted light, and/or light trespass. It evaluates the efficacy with which a luminaire delivers light to a rectangular area defined by the luminaire's own intensity distribution, encouraging luminaires to direct light efficiently to a target area. This metric has several advantages important to the evaluation of outdoor area luminaires by ENERGY STAR:

- 1) It is application-independent, i.e., it is not a function of site-specific conditions like required illuminance levels or mounting height. This is essential for product-level qualification.
- 2) It is applicable to all pole-mounted outdoor luminaires, regardless of IES luminaire classification.

- 3) Going beyond simple luminaire efficacy, FTE discourages high-angle light that does not contribute to uniform target coverage by not counting those lumens towards the efficacy score. Such luminous flux may cause glare, light pollution, and/or light trespass.
- 4) It discourages uncontrolled back (house-side) light, but recognizes the potential utility of properly controlled back light that contributes to uniform target coverage.
- 5) FTE is calculated using standard absolute photometry (IES-format files as per LM-79-08 and LM-63-02). No additional testing is required.

The most efficient lighting design uses the lowest wattage to provide the necessary quantity and quality of illumination for a given application. FTE quantifies luminaire performance to help lighting specifiers and end-users in selecting luminaires for efficient outdoor area and roadway lighting applications.

COMPARISON TO AUGUST 15 DRAFT

Key changes from the first draft (Aug 15, 2008) are summarized and explained below for each new lighting application included at this time.

Outdoor pole-mounted area and roadway luminaires

Metric	Aug 2008 Draft 1	Jul 2009 Draft 2	Explanation
Minimum Light Output	2300 lumens	1000 lumens	Stakeholder feedback indicated some applications require lower lumen packages
Zonal Lumen Density	Luminaire shall deliver 100% of total lumens within the 0°- 90° zone, with a maximum of 10% of total lumens delivered within the 80°- 90° zone.	Maximum Luminous Flux in Glare and Uplight Zones – limits percent of total flux and absolute lumens in high angle zones	Consistent with the new BUG* rating system referenced by the draft Model Lighting Ordinance (MLO)†
Beam Uniformity	Required maximum intensity in the 55-65° zone and limited intensity in other zones; differed by IES Luminaire Types I – V.	Addressed through Fitted Target Efficacy (FTE) metric	FTE works for all luminaire types

Minimum Luminaire Efficacy	50 lm/W	Replaced with FTE metric	FTE is a better measure of luminaire energy performance in these applications
----------------------------	---------	--------------------------	---

*Addendum A for IESNA TM-15-07: Backlight, Uplight, and Glare (BUG) Ratings. Available at www.iesna.org/PDF/Erratas/TM-15-07BUGRatingsAddendum.pdf.

†The Model Lighting Ordinance is under development by the IESNA and International Dark Sky Association. Information on the MLO is available at <http://www.darksky.org/mc/page.do?sitePageId=58880>.

Outdoor wall-mounted area luminaires (“wall packs”)

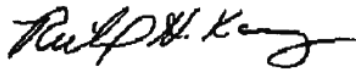
Metric	Aug 2008 Draft 1	Jul 2009 Draft 2	Explanation
Minimum Light Output	1300 lumens	300 lumens	Stakeholder feedback indicated some applications require lower lumen packages; revised estimate based on 13W CFL wall pack
Zonal Lumen Density	Luminaire shall deliver 100% of total lumens within the 0°- 90° zone, with a maximum of 10% of total lumens delivered within the 80°- 90° zone	Maximum Luminous Flux in Glare and Uplight Zones – limits percent of total flux in high angle zones	Consistent with the new BUG* rating system referenced by the draft Model Lighting Ordinance (MLO)† (see notes above)
Minimum Luminaire Efficacy	40 lm/W	52 lm/W	Based on updated review of HPS and MH wall packs

Parking garage/canopy luminaires

Metric	Aug 2008 Draft 1	Jul 2009 Draft 2	Explanation
Minimum Light Output	4000 lumens	2000 lumens	Revised estimate based on single lamp linear fluorescent luminaire
Zonal Lumen Density	Luminaire shall deliver a majority of total lumens (minimum 20% of total) in the 60°- 70° zone, with the majority of remaining lumens (minimum 15% of total) delivered in the 70°- 80° zone	Luminaire shall deliver a minimum of 20% of total lumens in the 60°- 70° zone.	Minimum requirement needed for adequate distribution
Minimum Luminaire Efficacy	56 lm/W	70 lm/W	Now benchmarked to linear fluorescent; previously benchmarked to HID

Please provide comments and input on these criteria through July 31, 2009 to ssl@drintl.com. DOE appreciates the level of stakeholder interest and detailed comments received on previous additions to the ENERGY STAR for SSL criteria. Thank you for your continued support of the ENERGY STAR program.

Sincerely,



Richard H. Karney, P.E.
ENERGY STAR Products Manager
U.S. Department of Energy

Attachments/Links:

1. [ENERGY STAR® Program Requirements for Solid State Lighting Luminaires, Proposed Category “A” Additions – Outdoor Area & Parking Garage](#)
2. [Fitted Target Efficacy \(FTE\) Overview](#)
3. [FTE Calculator \(beta\)](#), [calculator instructions](#) and [supporting materials](#)